



THE INTERNATIONAL EPD® SYSTEM

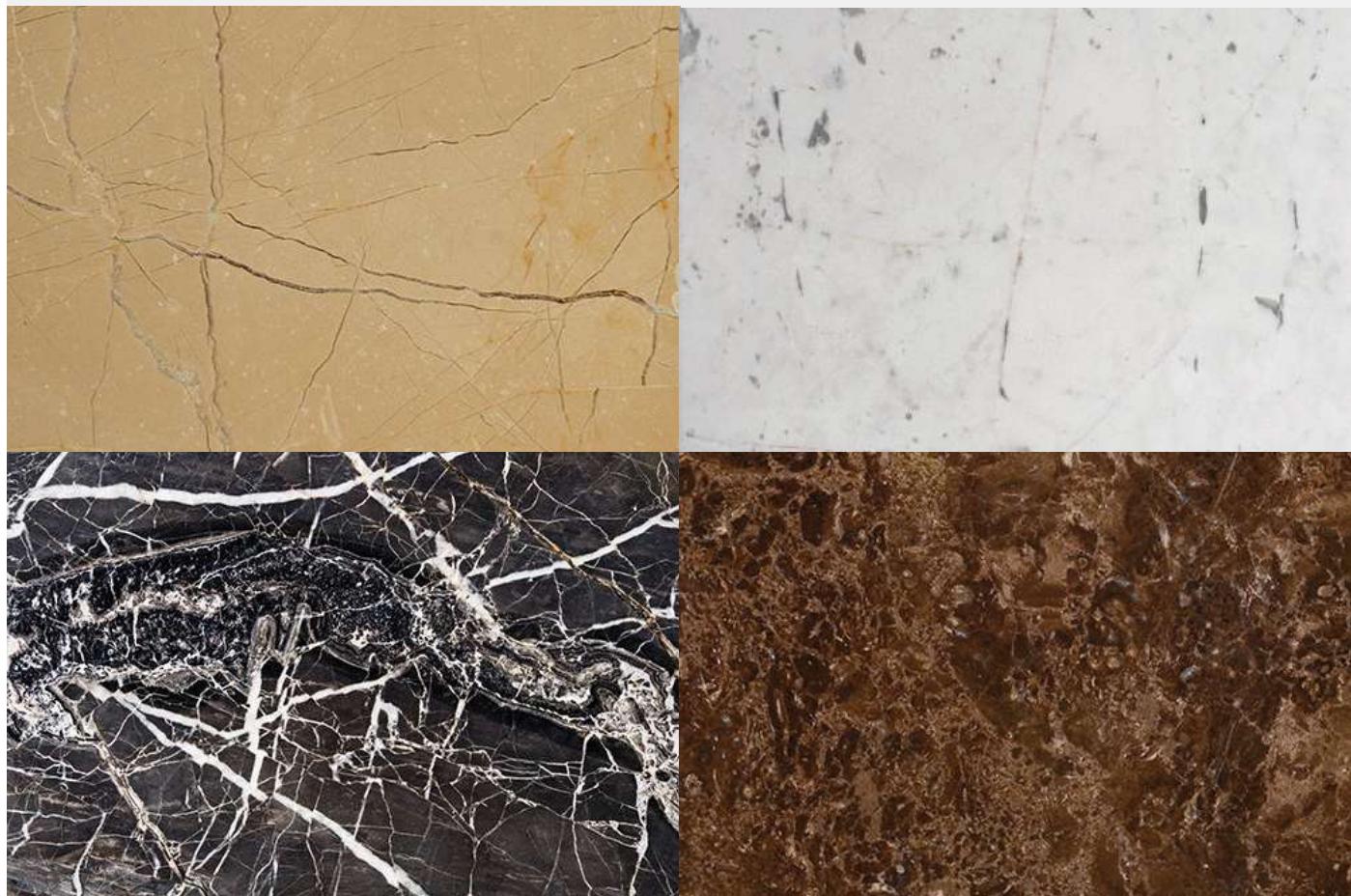


ENVIRONMENTAL PRODUCT DECLARATIONS

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for

Natural Stone from SILKARSTONE



SILKARSTONE



Programme:	EPD Turkey, a fully aligned regional programme www.epdturkey.org	The International EPD® System www.environdec.com
Programme operator:	EPD Turkey: SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kagithane/Istanbul, TURKEY	EPD International AB
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Geographical scope:	Global	

Owner of the EPD :

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 Bayrampaşa/Istanbul, Turkey

NATURAL STONE



Trade Catalog

SURFACING THE COLORS OF NATURE

Programme Information

Programme

EPD Turkey, a fully aligned regional programme

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Product Category Rules (PCR): 2019:14 Version 1.0, 2019-12-20, Construction Products and CPC 54 Construction Services, EN 15804:2012 + A2:2019 Sustainability of Construction Works

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification

EPD verification 

Third party verifier: Vladimír Kočí, PhD

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes

No 

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

About Company

At SilkarStone, we are proud to be a leading stone manufacturer, producing a variety of natural stone, mosaics, slabs, and tiles, and exporting product to over 35 countries across the globe.

Our company was established over thirty years ago, owns multiple quarries in Turkey and Greece, and two factories in Turkey. This vertical integration allows product quality to be controlled from start to finish while providing unparalleled service to clients planning complex architectural projects. With showrooms in London and Istanbul, as well as a joint venture in Qatar, China and the United States, we are able to assist with projects all over the world, providing quality custom products for large-scale bespoke projects.

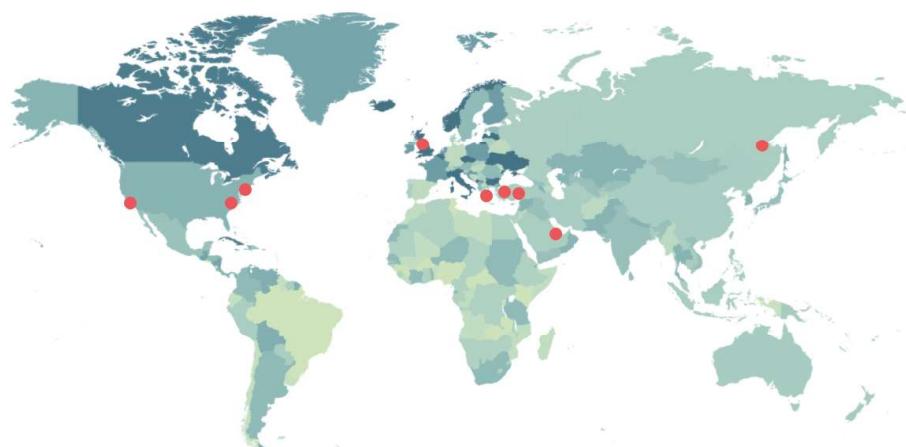
Through our sister company AKDO Intertrade, exclusive products are distributed to more than 350 dealers under the "AKDO" brand in the luxury tile and stone market of the United States.

Silkar is one of the largest mosaic manufacturers in the world, with exclusive designs and an impressive palette of natural stone colors. Our ability to produce incredible details custom mosaics and exclusive mosaic tiles make Silkar a unique

company in the design world.

In addition to offering slabs, mosaics, and cut-to-size tile, we continually invest in innovation beyond traditional stone product. Because of investments in new technologies such as lightweight laminated stone panels, Silkar has experienced great success within industries such as luxury yachting, furniture, interior, and exterior wall cladding, and more.

After working with mother nature's product for so long, we respect the earth and green movements. To date, Silkar continues to set standards in the natural stone industry with sustainable manufacturing. As a result of EPD (environmental product deceleration) studies, we have calculated our environmental impact within the complete life cycle for nine products according to ISO 14044 standard and published third-party approved statements. Silkar has EN ISO 9001 Quality Management System, EN ISO 14001 Environmental Management System and ISO 45001 Occupational Health & Safety Management System Certifications. We hope to be your solution partner in the natural stone business. Allow us to show you why SilkarStone has become an international leader in the natural stone industry.



Product Information

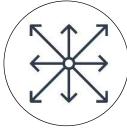
Silkar has many natural stone quarries located in various countries. Natural stones brought to factories as blocks can be cut in various thicknesses such as 1 cm, 2 cm, 3 cm, 4 cm and 5 cm. It becomes ready to use after necessary surface treatments.

The density of Natural Stones is 2.7 tonne/m³. Natural stone products are supported by approximately 1% structure backing material (mesh) and epoxy-based adhesive, consist of 99% natural stone.

Product weights depending on thickness are as follows:

Thickness	Weight
1 cm	27 kg/m ²
2 cm	54 kg/m ²
3 cm	81 kg/m ²
4 cm	108 kg/m ²
5 cm	135 kg/m ²

The UN CPC code of the product is 3761.

Installation	Thickness	Finish	Dimensions
 Adhesion; Cement, Epoxy, Silicone	 10-50mm ...	 Polished, Honed, Brushed	 2x3cm Slab 300x300 mm 300x600 mm 400x800 mm 600x1200 mm cut to size

Technical Properties

		Value		
		Min.	Max	Test Standards
Impact Resistance Mpa		67.7	70.3	TS 699
Abrasion Resistance cm ³ /50 cm ²		13.4	26.9	EN 14157
Abrasion Resistance mm		18.5	24	EN 14157
Compressive Strength Mpa		125	192	EN 1926
Water Absorption at Atmospheric Pressure %		0.06	0.3	EN 13755
Water Absorption Coefficient of Natural Stone by Capillarity g/m ² s ^{0.5}		-	1.26	EN 1925
Flexural Strength Under Constant Moment Mpa		5.8	9.1	EN13161
Slip Resistance - Honned-Dry		35	47	EN 14231
Slip Resistance - Honned-Wet		20	21	EN 14231
Breaking Load at Dowel Hole N		1400	2104	EN 13364
Flexural Strength Under a Concentrated Load Mpa		7.2	11.7	EN 12372
Flexural Strength Changing After Thermal Shock %		-0.14	-12.5	EN 14066
Open Porosity %		0.13	0.9	EN 12371



Astra White
Astra White Venato
Athens Gray
Brown Queen
Café Latte Dark
Calacatta
Calacatta Helena
Carrara
Castano Brown
Coastal Gray
Crema Alexandra
Crema Cornucopia
Dark Olive
Emperador Dark
Ephesus Dune
Granville Beige
Lilac
Maya White
Nero Marquina
New Luget
Oro Gray
Oro White
Savana Gray
Silver Gray
Silver Stone
Silver Wood
Terra Gray
Vega Light
Waving Wood



LCA Information

Declared Unit	1 m ² of SILKARSTONE Natural Stone with various weights and thicknesses
Time Representativeness	2019
Database(s) and LCA Software Used	TLCID ver. 1.0 (Turkish Lifecycle Inventory Database), Ecoinvent 3.6, SimaPro 9.1

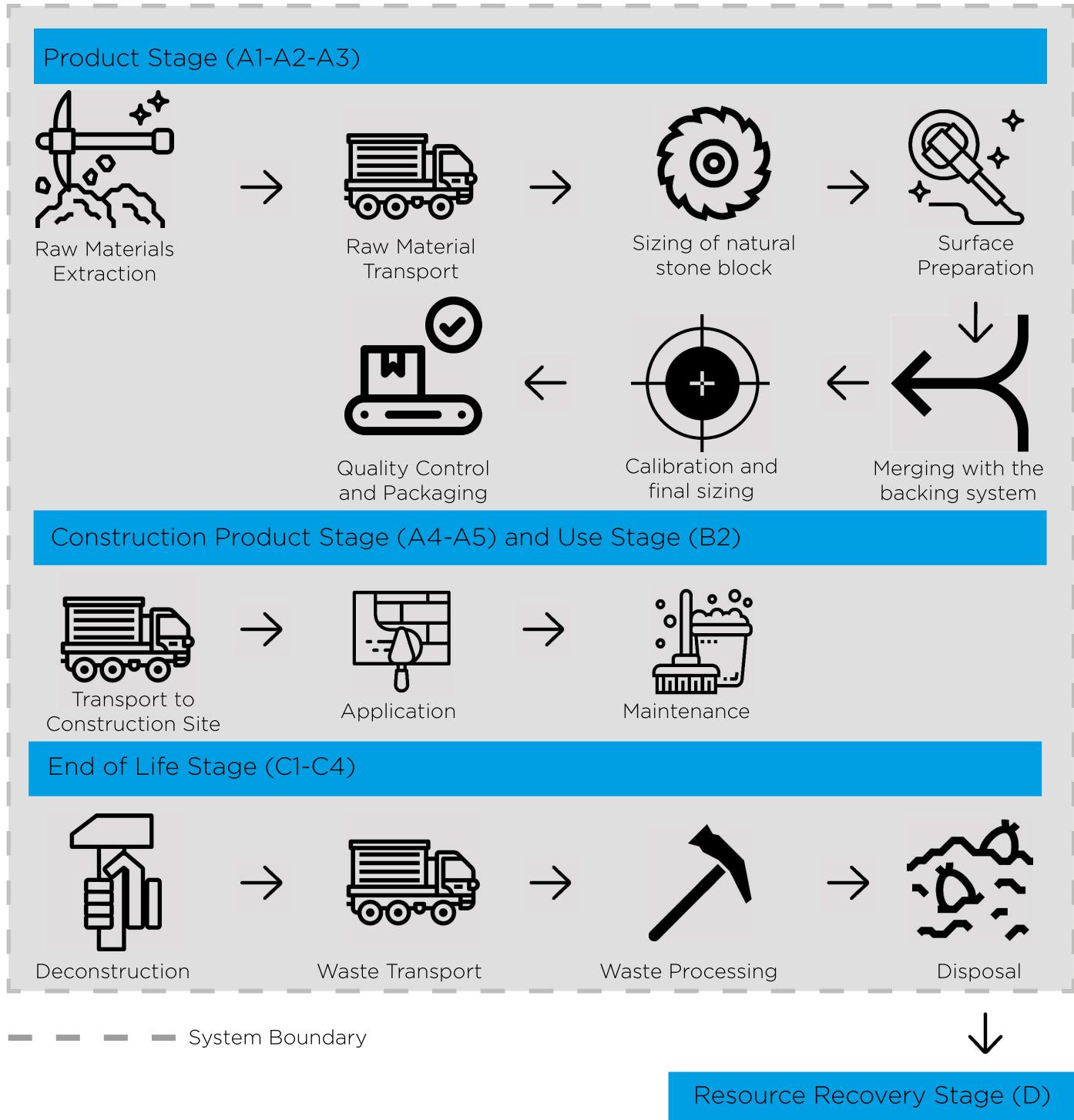
The inventory for the LCA study is based on the 2019 production figures for SILKAR Natural Stone by SILKARSTONE production plants in Bilecik, Turkey.

This EPD's system boundary is cradle to grave. The system boundary covers A1 - A3 product stages, A4 - A5 construction, B1 - B7 use and C1 - C4 end of life and D stages.

		Upstream		Core		Downstream														Other Environmental Information	
		Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction, demolition	Transport	Waste Processing	Disposal	Future reuse, recycling or energy recovery potentials	D	Environmental Information	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			

X = Included in LCA

Description of System Boundary



Excluded Lifecycle Stages: Travel to and from work by personnel, business travel, etc. are excluded life cycle stages.

A1: Raw Material Supply

SILKARSTONE's productions start from mining. The company supplies its raw materials necessary from its mine sites or other mines. Raw material supply includes raw material extraction/preparation and pre-treatment processes before production.

A2: Transportation

Transport is relevant for delivery of raw materials and other materials to the plant and the transport of materials within the plant. Transport of raw materials to production site is taken as the weight average values for transport from raw materials supplier in 2019.

A3: Manufacturing

Manufacturing starts with the selection of the blocks for production. After reinforcing, the block is sliced and dried. Production continues with the epoxy process for adding more durability. After surface preparation, the product is ready as slabs or cut to the final size. Final products are quality checked and package to delivery.

A4: Transport From the Gate to the Site

Transport of final product to construction site is taken as the weight average values for transport to customers in 2019.

Scenario Information	Value (expressed per functional/declared unit)
Vehicle Type	Road, Lorry, >32 metric ton, Euro 5 Motor Sea, Container Ship
Data Type	Related transport data from Ecovent 3.6
Distance to Construction Site	946 km weighted average by lorry to all markets 3699 km weighted average by ship to all markets
Bulk Density of Transported Products	2700 kg/m ³

A5: Assembly

This stage includes the SILKAR Natural Stone application on the construction site. There is no energy use during installation, manpower is sufficient. For the installation of SILKAR Natural Stone to the surface, 6-7 kg/m² cement based adhesive mortar or 9 kg/m² steel backing structure are used according to the thickness and product technical datasheet.

Scenario Information	Value (expressed per functional/declared unit)	
Ancillary Materials for Installation	6-7 kg/m ² cement based adhesive mortar	9 kg/m ² steel backing frame
Water Use	included in the mortar 0.00065 m ³ water	Not necessary
Other Resource Use	Not necessary	Not necessary
Quantitative description of energy type (regional mix) and consumption during the installation process	Not necessary	Not necessary

B1 : Use Stage is related to any impacts done during use of the product.

B2 : Maintenance

This stage is related to any activities to maintain the function of the product in its life time. It includes cleaning with water and detergent. SILKARSTONE recommends using detergent containing stain remover or neutral low-sulphate and rinse with tap water after cleaning.

Monthly for about 50 years, 5 gr detergent and 0.1 L water use are assumed to clean the surfaces of natural stone products.

Scenario Information	Value (expressed per functional/declared unit)
Maintenance Process	Cleaning the surface of product
Maintenance Cycle	Monthly during 50 years (600 times)
Ancillary Materials for Maintenance	3 kg during whole cycle
Net Fresh Water Consumption	0.012 m ³
Energy Input During Maintenance	Not necessary

B3 : Repair is not necessary in use.

B4 : Replacement is not necessary in use.

B5 : Refurbishment is not necessary in use

B6 : Operational Energy Use

No energy is used in operation.

B7 : Operational Water Use

No water is used in operation.

C1 : Deconstruction and Demolition

There is no energy use during uninstalation, manpower and some tools are sufficient.

C2 : Transport

This stage includes the transportation of the discarded conductors to final disposal. Average distance from demolition site to waste processing site for final disposal is assumed to be 100 km.

C3 : Waste Processing

If the wastes are going to landfill or to be inert filler, there is no need for any waste process.

C4 : Disposal

Disposal is the final stage of product life. SILKAR Natural Stone may dispose with any disposal scenario after construction and demolition as their final fate and modelled as such for this EPD. It is assumed that 25% of the wastes used as inert filler, 75% of the wastes send to the inert landfill site.

D : Benefits and Loads

In this stage, inert filler benefits were calculated specified in the disposal stage.

More Information

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR. Accordingly, hazardous and non-hazardous waste amounts were also allocated from 2019 total waste arisings. The natural stone sector has a high amount of production wastage due to its nature. All production wastage is included in the LCA model. Wastes arising from production are disposed in accordance with regional legal regulations and sent to inert waste sites.

There are no co-products in the production. Hence, there is no need for co-product allocation.

Energy consumptions and transports datasets were allocated based on the production figures in 2019 and the weighted averaged of environmental impacts for the SILKARSTONE's products was presented. No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in SILKARSTONE's products, either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).



LCA Results

Environmental Impacts for 1 m² of Natural Stone (10 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP - Fossil	kg CO ₂ eq	1.96	3.77	6.62	12.3	3.23	1.68	0	2.98	0	0	0	0	0	0.243	0	0.141	-0.251	
GWP - Biogenic	kg CO ₂ eq	4.75E-3	1.7E-3	-4.97	4.98E+0	1.39E-3	29.0E-3	0	-6.95	0	0	0	0	0	177E-6	0	279E-6	-200E-6	
GWP - Luluc	kg CO ₂ eq	5.56E-3	1.4E-3	46.3E-3	0.053	1.32E-3	770E-6	0	4.29E+0	0	0	0	0	0	71.0E-6	0	39.3E-6	-144.5E-6	
GWP - Total	kg CO ₂ eq	1.97	3.77	1.69	7.43	3.23	1.71	0	0.322	0	0	0	0	0	0.244	0	0.141	-0.252	
ODP	kg CFC-11 eq	3355E-9	850E-9	345E-9	1.53E-6	728E-9	105E-9	0	496E-9	0	0	0	0	0	57.2E-9	0	58.0E-9	-48.7E-9	
AP	mol H+ eq	0.015	0.043	0.036	0.093	0.040	0.007	0	0.041	0	0	0	0	0	0.001	0	0.001	-0.002	
EP - Freshwater	kg PO ₄ eq	7355E-6	232E-6	4.74E-3	0.006	199E-6	261E-6	0	1.27E-3	0	0	0	0	0	17.2E-6	0	14.5E-6	-37.2E-6	
EP - Marine	kg N eq	0.005	0.012	0.007	0.023	0.010	0.002	0	0.040	0	0	0	0	0	0.0003	0	0.0005	-0.001	
EP - Terrestrial	mol N eq	19.0	42.1	59.2	120	36.2	31.0	0	368	0	0	0	0	0	3.01	0	2.56	-3.73	
POCP	kg NMVOOC	0.014	0.036	0.020	0.070	0.032	0.005	0	0.019	0	0	0	0	0	0.001	0	0.001	-0.002	
ADPE	kg Sb eq	16.9E-6	52.8E-6	23.3E-6	92.9E-6	46.2E-6	109E-6	0	204E-6	0	0	0	0	0	4.15E-6	0	1.29E-6	-6.06E-6	
ADPF	MJ	27.5	55.7	87.0	170	47.7	11.6	0	31.4	0	0	0	0	0	3.78	0	3.94	-3.57	
WDP	m ³ depriv.	1.93	0.155	5.74	7.82	0.134	0.175	0	11.6	0	0	0	0	0	0.012	0	0.177	-0.311	
PM	disease inc.	1.60E-6	316E-9	233E-9	2.15E-6	237E-9	75.4E-9	0	605E-9	0	0	0	0	0	22.0E-9	0	26.0E-9	-23.9E-9	
IR	kBq U-235 eq	0.118	0.276	0.138	0.53	0.236	0.064	0	0.195	0	0	0	0	0	0.019	0	0.018	-0.018	
ETP - FW	CTUe	19.0	42.1	59.2	120	36.2	31.0	0	368	0	0	0	0	0	3.01	0	2.56	-2.51	
HTTP - C	CTUh	558E-12	1.4E-9	3.02E-9	5.0E-9	1.23E-9	521E-12	0	10.2E-9	0	0	0	0	0	74.3E-12	0	59.1E-12	-160E-12	
HTTP - NC	CTUh	23.7E-9	45.1E-9	55.9E-9	125E-9	38.6E-9	15.6E-9	0	249E-9	0	0	0	0	0	3.44E-9	0	1.83E-9	-3.82E-9	
SQP	Pt	3.62	49.5	431	485	42.6	19.2	0	321	0	0	0	0	0	4.33	0	8.26	-7.57	

Acronyms
 GWP-tot: Climate change, GWP-fossil: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTTP-c: Cancer human health effects, SQP: Land use related impacts, soil quality.

Legend
 A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

Disclaimer 1
 This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2
 The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Resource Use for 1 m² of Natural Stone (10 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
PERE	MJ	1.86	0.616	70.9	73.4	0.531	1.25	0	61.2	0	0	0	0	0	0	0	0	0.048	0	0.032	-0.073
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	1.86	0.616	70.9	73.4	0.531	1.25	0	61.2	0	0	0	0	0	0	0	0	0.048	0	0.032	-0.073
PENRE	MJ	28	55.7	87.0	170	47.7	12	0	37.4	0	0	0	0	0	0	0	0	3.78	0	3.94	-3.57
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	27.5	55.7	87.0	170	47.7	12	0	37.4	0	0	0	0	0	0	0	0	3.78	0	3.94	-3.57
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	0.171	0.010	0.092	0.273	0.009	0.034	0	0.881	0	0	0	0	0	0	0.001	0	0.004	-0.024		

Waste & Output Flows for 1 m² of Natural Stone (10 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0	0	0.013	0.013	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NHWD	kg	0	0	30.9	30.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PENRE: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy thermal.

Result per functional declared unit

Biogenic Carbon Content	Unit	A1-A3	Unit	A1-A3
Biogenic carbon content in product	kg C	0	kg C	0
Biogenic carbon content in packaging	kg C	1.28	kg C	1.28

Note: It was assumed 50% of the wood packaging material is biogenic carbon.

Environmental Impacts for 1 m² of Natural Stone (20 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP - Fossil	kg CO ₂ eq	3.24	7.49	12.05	22.8	6.43	1.68	0	2.98	0	0	0	0	0	0.484	0	0.280	-0.500	
GWP - Biogenic	kg CO ₂ eq	6.71E-3	3.40E-3	-4.96E+0	-4.95	2.76E-3	29.0E-3	0	-6.95	0	0	0	0	0	0	352E-6	0	556E-6	-398E-6
GWP - Luluc	kg CO ₂ eq	10.6E-3	2.85E-3	89.4E-3	0.103	2.62E-3	770E-6	0	4.29E+0	0	0	0	0	0	0	141E-6	0	78.2E-6	-287E-6
GWP - Total	kg CO ₂ eq	3.26	7.50	7.18	17.9	6.44	1.71	0	0.322	0	0	0	0	0	0.485	0	0.281	-0.501	
ODP	kg CFC-11 eq	518E-9	1.69E-6	587E-9	2.80E-6	1.45E-6	105E-9	0	496E-9	0	0	0	0	0	0	114E-9	0	115.5E-9	-97.0E-9
AP	mol H+ eq	0.026	0.086	0.065	0.176	0.080	0.007	0	0.041	0	0	0	0	0	0	0.002	0	0.003	-0.005
EP - Freshwater	kg PO ₄ eq	1.25E-3	461E-6	9.15E-3	0.011	397E-6	261E-6	0	1.27E-3	0	0	0	0	0	0	34.3E-6	0	28.8E-6	-74.0E-6
EP - Marine	kg N eq	0.009	0.023	0.012	0.044	0.021	0.002	0	0.040	0	0	0	0	0	0	0.0006	0	0.0009	-0.001
EP - Terrestrial	mol N eq	26.3	83.8	95.7	206	72.0	31.0	0	368	0	0	0	0	0	0	6.00	0	5.09	-7.42
POCP	kg NMVOOC	0.026	0.071	0.033	0.130	0.063	0.005	0	0.019	0	0	0	0	0	0	0.002	0	0.003	-0.005
ADPE	kg Sb eq	17.9E-6	105E-6	30.4E-6	153E-6	91.9E-6	109E-6	0	204E-6	0	0	0	0	0	0	826E-6	0	2.57E-6	-12.1E-6
ADPF	MJ	43.9	111	150	305	94.9	11.6	0	31.4	0	0	0	0	0	0	7.53	0	7.84	-7.11
WDP	m ³ depriv.	3.54	0.309	11.0	14.8	0.266	0.175	0	11.6	0	0	0	0	0	0	0.024	0	0.352	-0.620
PM	disease inc.	3.17E-6	630E-9	347E-9	4.15E-6	471E-9	75.4E-9	0	605E-9	0	0	0	0	0	0	43.8E-9	0	51.7E-9	-47.5E-9
IR	kBq U-235 eq	0.167	0.549	0.196	0.913	0.470	0.064	0	0.195	0	0	0	0	0	0	0.038	0	0.035	-0.037
ETP - FW	CTUe	26.3	83.8	95.7	206	72.0	31.0	0	368	0	0	0	0	0	0	6.00	0	5.09	-7.42
HTTP - C	CTUh	675E-12	2.76E-9	3.76E-9	7.20E-9	2.45E-9	521E-12	0	10.2E-9	0	0	0	0	0	0	147.8E-12	0	118E-12	-363E-12
HTTP - NC	CTUh	31.3E-9	89.7E-9	92.6E-9	213E-9	76.9E-9	15.6E-9	0	249E-9	0	0	0	0	0	0	6.84E-9	0	3.63E-9	-7.61E-9
SQP	Pt	5.20	98.6	445	549	84.7	19.2	0	321	0	0	0	0	0	0	8.62	0	16.4	-15.1

Acronyms
 GWP-tot: Climate change, GWP-fossil: Climate change - fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTTP-c: Cancer human health effects, HTTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.

Legend
 A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

Disclaimer 1
 This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2
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Resource Use for 1 m² of Natural Stone (20 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	3.06	1.23	81.1	85.4	1.06	1.25	0	61.2	0	0	0	0	0	0.095	0	0.063	-0.145	
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PERT	MJ	3.06	1.23	81.1	85.4	1.06	1.25	0	61.2	0	0	0	0	0	0.095	0	0.063	-0.145	
PENRE	MJ	43.9	111	150	305	94.9	12	0	37.4	0	0	0	0	0	7.53	0	7.84	-7.11	
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PENRT	MJ	43.9	111	150	305	94.9	12	0	37.4	0	0	0	0	0	7.53	0	7.84	-7.11	
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FW	m ³	0.338	0.020	0.179	0.536	0.017	0.034	0	0.881	0	0	0	0	0	0.002	0	0.009	-0.047	

Waste & Output Flows for 1 m² of Natural Stone (20 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0	0	0.026	0.026	0	0	0	0	0	0	0	0	0	0	0	0	0	
NHWD	kg	0	0	61.5	61.5	0	0	0	0	0	0	0	0	0	0	0	0	0	
RWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EE (Electrical)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EE (Thermal)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRT: Total use of non-renewable primary energy, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water, HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy thermal.

Result per functional declared unit

Biogenic Carbon Content	Unit	A1-A3	Unit	A1-A3
Biogenic carbon content in product	kg C	0	kg C	0
Biogenic carbon content in packaging	kg C	1.28	kg C	1.28

Note: It was assumed 50% of the wood packaging material is biogenic carbon.

Environmental Impacts for 1 m² of Natural Stone (30 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP - Fossil	kg CO ₂ eq	4.53	11.2	17.4	33.1	9.60	19.0	0	2.98	0	0	0	0	0	0.722	0	0.420	-0.746	
GWP - Biogenic	kg CO ₂ eq	8.67E-3	5.08E-3	-4.93	4.12E-3	55.3E-3	0	-6.95	0	0	0	0	0	0	525E-6	0	833E-6	-594E-6	
GWP - Luluc	kg CO ₂ eq	15.6E-3	4.26E-3	132E-3	0.152	3.91E-3	12.9E-3	0	4.29E+0	0	0	0	0	0	211E-6	0	117E-6	-429E-6	
GWP - Total	kg CO ₂ eq	4.55	11.19	12.6	28.4	9.61	19.1	0	0.322	0	0	0	0	0	0.723	0	0.421	-0.747	
ODP	kg CFC-11 eq	701E-9	2.53E-6	827E-9	4.05E-6	2.16E-6	1.04E-6	0	496E-9	0	0	0	0	0	170E-9	0	173E-9	-145E-9	
AP	mol H+ eq	0.037	0.128	0.094	0.258	0.119	0.108	0	0.041	0	0	0	0	0	0.003	0	0.004	-0.007	
EP - Freshwater	kg PO ₄ eq	1.77E-3	688E-6	13.5E-3	0.016	592E-6	11.3E-3	0	1.27E-3	0	0	0	0	0	51.2E-6	0	43.1E-6	-110E-6	
EP - Marine	kg N eq	0.013	0.034	0.017	0.064	0.031	0.022	0	0.040	0	0	0	0	0	0.0009	0	0.0014	-0.002	
EP - Terrestrial	mol N eq	33.5	125.1	132	290	107	807	0	368	0	0	0	0	0	8.95	0	7.62	-11.1	
POCP	kg NMVOOC	0.038	0.106	0.046	0.189	0.094	0.086	0	0.019	0	0	0	0	0	0.003	0	0.004	-0.007	
ADPE	kg Sb eq	18.9E-6	157E-6	37.4E-6	213E-6	137E-6	455E-6	0	204E-6	0	0	0	0	0	12.3E-6	0	3.84E-6	-18.0E-6	
ADPF	MJ	60.2	165	213	438	142	206	0	31.4	0	0	0	0	0	11.2	0	11.7	-10.61	
WDP	m ³ depriv.	5.15	0.462	16.2	21.8	0.397	2.93	0	11.6	0	0	0	0	0	0.037	0	0.526	-0.925	
PM	disease inc.	4.74E-6	940E-9	461E-6	703E-9	1.78E-6	0	605E-9	0	0	0	0	0	0	65.3E-9	0	77.4E-9	-70.9E-9	
IR	kBq U-235 eq	0.217	0.819	0.255	1.29	0.701	1.014	0	0.195	0	0	0	0	0	0.057	0	0.052	-0.055	
ETP - FW	CTUe	33.5	125	131.9	290	107.4	807	0	368	0	0	0	0	0	8.95	0	7.62	-11.08	
HTTP - C	CTUh	791E-12	4.12E-9	4.49E-9	9.41E-9	3.65E-9	222E-9	0	10.2E-9	0	0	0	0	0	221E-12	0	176E-12	-542E-12	
HTTP - NC	CTUh	38.8E-9	134E-9	129E-9	302E-9	115E-9	1.68E-6	0	249E-9	0	0	0	0	0	10.2E-9	0	5.44E-9	-11.4E-9	
SQP	Pt	6.79	147.1	459	613	126	84.7	0	321	0	0	0	0	0	12.9	0	24.6	-22.5	

Acronyms
 GWP-tot: Climate change, GWP-fossil: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTTP-c: Cancer human health effects, HTTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.

Legend
 A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

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Resource Use for 1 m² of Natural Stone (30 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	4.26	1.83	91.3	97.3	1.58	31.2	0	61.2	0	0	0	0	0	0	0.141	0	0.095	-0.217
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	4.26	1.83	91.3	97.3	1.58	31.2	0	61.2	0	0	0	0	0	0	0.141	0	0.095	-0.217
PENRE	MJ	60.2	165	213	438	142	206	0	37.4	0	0	0	0	0	0	11.2	0	11.7	-10.6
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	60.2	165	213	438	142	206	0	37.4	0	0	0	0	0	0	11.2	0	11.7	-10.6
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	0.505	0.030	0.264	0.799	0.025	0.150	0	0.881	0	0	0	0	0	0	0.002	0	0.013	-0.070

Waste & Output Flows for 1 m² of Natural Stone (30 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0	0	0.039	0.039	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NHWD	kg	0	0	91.8	91.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PENRE: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water, HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy thermal.

Result per functional declared unit

Biogenic Carbon Content	Unit	A1-A3	Unit	A1-A3
Biogenic carbon content in product	kg C	0	kg C	0
Biogenic carbon content in packaging	kg C	1.28	kg C	1.28

Note: It was assumed 50% of the wood packaging material is biogenic carbon.

Environmental Impacts for 1 m² of Natural Stone (40 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP - Fossil	kg CO ₂ eq	5.81	15.0	22.9	43.7	12.8	19.0	0	2.98	0	0	0	0	0	0.966	0	0.560	-0.998	
GWP - Biogenic	kg CO ₂ eq	10.6E-3	6.79E-3	-4.93E+0	-4.91	5.51E-3	55.3E-3	0	-6.95	0	0	0	0	0	702E-6	0	1.11E-3	-794E-6	
GWP - Luluc	kg CO ₂ eq	20.6E-3	5.69E-3	176E-3	0.202	5.23E-3	12.9E-3	0	4.29E+0	0	0	0	0	0	282E-6	0	156E-6	-574E-6	
GWP - Total	kg CO ₂ eq	5.84	15.0	18.2	39.0	12.8	19.1	0	0.322	0	0	0	0	0	0.967	0	0.561	-0.999	
ODP	kg CFC-11 eq	8855E-9	3.38E-6	1.07E-6	5.33E-6	2.89E-6	1.04E-6	0	496E-9	0	0	0	0	0	227E-9	0	230E-9	-193E-9	
AP	mol H+ eq	0.048	0.171	0.123	0.342	0.159	0.108	0	0.041	0	0	0	0	0	0.004	0	0.005	-0.010	
EP - Freshwater	kg PO ₄ eq	2.28E-3	920E-6	18.0E-3	0.021	792E-6	11.3E-3	0	1.27E-3	0	0	0	0	0	68.4E-6	0	57.5E-6	-148E-6	
EP - Marine	kg N eq	0.017	0.046	0.022	0.085	0.041	0.022	0	0.040	0	0	0	0	0	0.0012	0	0.0018	-0.003	
EP - Terrestrial	mol N eq	40.8	167	169	377	144	807	0	368	0	0	0	0	0	11.96	0	10.1	-14.8	
POCP	kg NMVOOC	0.050	0.141	0.059	0.250	0.126	0.086	0	0.019	0	0	0	0	0	0.004	0	0.006	-0.009	
ADPE	kg Sb eq	19.9E-6	210E-6	44.6E-6	274E-6	183E-6	455E-6	0	204E-6	0	0	0	0	0	16.5E-6	0	5.12E-6	-241E-6	
ADPF	MJ	76.5	221	276	574	189	206	0	31.4	0	0	0	0	0	15.0	0	15.6	-14.2	
WDP	m ³ depriv.	6.76	0.617	21.5	28.9	0.531	2.93	0	11.6	0	0	0	0	0	0.049	0	0.701	-1.24	
PM	disease inc.	6.31E-6	1.26E-6	576E-9	8.15E-6	940E-9	1.78E-6	0	605E-9	0	0	0	0	0	87.4E-9	0	103E-9	-94.7E-9	
IR	kBq U-235 eq	0.267	1.10	0.314	1.68	0.938	1.01	0	0.195	0	0	0	0	0	0.077	0	0.070	-0.073	
ETP - FW	CTUe	40.8	167	169	377	144	807	0	368	0	0	0	0	0	11.96	0	10.15	-14.81	
HTTP - C	CTUh	908E-12	5.51E-9	5.24E-9	11.7E-9	4.89E-9	222E-9	0	10.2E-9	0	0	0	0	0	295E-12	0	235E-12	-725E-12	
HTTP - NC	CTUh	46.4E-9	179E-9	166E-9	391E-9	153E-9	1.68E-6	0	249E-9	0	0	0	0	0	13.6E-9	0	7.25E-9	-152E-9	
SQP	Pt	8.37	196.7	472	678	169	84.7	0	321	0	0	0	0	0	17.2	0	32.8	-30.1	

Acronyms
 GWP-t-total: Climate change, GWP-fossil: Climate change - fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTTP-c: Cancer human health effects, HTTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.

Legend
 A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

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Resource Use for 1 m² of Natural Stone (40 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	5.46	2.44	102	110	2.11	31.2	0	61.2	0	0	0	0	0	0.189	0	0.126	-0.290	
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PERT	MJ	5.46	2.44	102	110	2.11	31.2	0	61.2	0	0	0	0	0	0.189	0	0.126	-0.290	
PENRE	MJ	76.5	221	276	574	189	206	0	37.4	0	0	0	0	0	15.0	0	15.6	-14.2	
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PENRT	MJ	76.5	221	276	574	189	206	0	37.4	0	0	0	0	0	15.0	0	15.6	-14.2	
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FW	m ³	0.671	0.040	0.352	1.063	0.034	0.150	0	0.881	0	0	0	0	0	0.003	0	0.017	-0.094	

Waste & Output Flows for 1 m² of Natural Stone (40 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0	0	0.053	0.053	0	0	0	0	0	0	0	0	0	0	0	0	0	
NHWD	kg	0	0	123	123	0	0	0	0	0	0	0	0	0	0	0	0	0	
RWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EE (Electrical)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EE (Thermal)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Acronyms
 PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PENRE: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water, HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy thermal.

Result per functional declared unit

Biogenic Carbon Content	Unit	A1-A3	Unit	A1-A3
Biogenic carbon content in product	kg C	0	kg C	0
Biogenic carbon content in packaging	kg C	1.28	kg C	1.28

Note: It was assumed 50% of the wood packaging material is biogenic carbon.

Environmental Impacts for 1 m² of Natural Stone (50 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP - Fossil	kg CO ₂ eq	7.09	18.7	28.3	54.1	16.0	19.0	0	2.98	0	0	0	0	0	1.21	0	0.699	-1.25	
GWP - Biogenic	kg CO ₂ eq	12.6E-3	8.48E-3	-4.92E+0	-4.90	6.89E-3	55.3E-3	0	-6.95	0	0	0	0	0	876E-6	0	1.39E-3	-992E-6	
GWP - Luluc	kg CO ₂ eq	25.7E-3	7.11E-3	219E-3	0.251	6.53E-3	12.9E-3	0	4.29E+0	0	0	0	0	0	352E-6	0	195E-6	-717E-6	
GWP - Total	kg CO ₂ eq	7.13	18.7	23.6	49.5	16.0	19.1	0	0.322	0	0	0	0	0	1.21	0	0.701	-1.248	
ODP	kg CFC-11 eq	1.07E-6	4.22E-6	1.31E-6	6.60E-6	3.61E-6	1.04E-6	0	496E-9	0	0	0	0	0	284E-9	0	288E-9	-242E-9	
AP	mol H+ eq	0.059	0.214	0.152	0.425	0.198	0.108	0	0.041	0	0	0	0	0	0.005	0	0.007	-0.012	
EP - Freshwater	kg PO ₄ eq	2.80E-3	1.15E-3	22.4E-3	0.026	989E-6	11.3E-3	0	1.27E-3	0	0	0	0	0	85.4E-6	0	71.8E-6	-184E-6	
EP - Marine	kg N eq	0.021	0.057	0.027	0.105	0.052	0.022	0	0.040	0	0	0	0	0	0.0015	0	0.0023	-0.004	
EP - Terrestrial	mol N eq	48.0	209	205	462	179	807	0	368	0	0	0	0	0	14.9	0	12.7	-18.5	
POCP	kg NMVOOC	0.062	0.177	0.072	0.310	0.158	0.086	0	0.019	0	0	0	0	0	0.005	0	0.007	-0.011	
ADPE	kg Sb eq	20.9E-6	262E-6	51.7E-6	334E-6	229E-6	455E-6	0	204E-6	0	0	0	0	0	20.6E-6	0	6.40E-6	-30.1E-6	
ADPF	MJ	92.9	276	339	709	237	206	0	31.4	0	0	0	0	0	18.8	0	19.5	-17.7	
WDP	m ³ depriv.	8.38	0.771	26.8	36.0	0.663	2.93	0	11.6	0	0	0	0	0	0.061	0	0.876	-1.54	
PM	disease inc.	7.89E-6	1.57E-6	691E-9	10.1E-6	1.17E-6	1.78E-6	0	605E-9	0	0	0	0	0	109E-9	0	129E-9	-118E-9	
IR	kBq U-235 eq	0.317	1.37	0.373	2.06	1.17	1.01	0	0.195	0	0	0	0	0	0.096	0	0.087	-0.092	
ETP - FW	CTUe	48.0	209	205	462	179	807	0	368	0	0	0	0	0	14.9	0	12.7	-18.5	
HTTP - C	CTUh	1.02E-9	6.89E-9	5.98E-9	13.9E-9	6.10E-9	222E-9	0	10.2E-9	0	0	0	0	0	368E-12	0	293E-12	-906E-12	
HTTP - NC	CTUh	54.0E-9	224E-9	203E-9	480E-9	192E-9	1.68E-6	0	249E-9	0	0	0	0	0	17.0E-9	0	9.06E-9	-19.0E-9	
SQP	Pt	9.96	246	486	742	211	84.7	0	321	0	0	0	0	0	21.5	0	41.0	-37.6	

Acronyms
 GWP-tot: Climate change, GWP-fossil: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTTP-c: Cancer human health effects, HTTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.

Legend
 A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

Disclaimer 1
 This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2
 The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Resource Use for 1 m² of Natural Stone (50 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	6.66	3.05	112	122	2.63	31.2	0	61.2	0	0	0	0	0	0	0.236	0	0.158	-0.363
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	6.66	3.05	112	122	2.63	31.2	0	61.2	0	0	0	0	0	0	0.236	0	0.158	-0.363
PENRE	MJ	92.9	276	339	709	237	206	0	37.4	0	0	0	0	0	0	18.8	0	19.5	-17.7
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	92.9	276	339	709	237	206	0	37.4	0	0	0	0	0	0	18.8	0	19.5	-17.7
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	0.838	0.049	0.438	1.33	0.043	0.150	0	0.881	0	0	0	0	0	0	0.004	0	0.021	-0.117

Waste & Output Flows for 1 m² of Natural Stone (50 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0	0	0.066	0.066	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NHWD	kg	0	0	153	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PENRE: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water, HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy thermal.

Result per functional declared unit

Biogenic Carbon Content	Unit	A1-A3	Unit	A1-A3
Biogenic carbon content in product	kg C	0	kg C	0
Biogenic carbon content in packaging	kg C	1.28	kg C	1.28

Note: It was assumed 50% of the wood packaging material is biogenic carbon.

Additional Information

For the American market, environmental impacts were calculated with the TRACI 2.1 method as additional information. The results of the calculations taken with the same LCA model are given in the tables below.

Environmental Impacts for 1 m ² of Natural Stone (10 mm)											
Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B2	C2	C4	D
GWP	kg CO ₂ eq	1.93	3.73	6.50	12.2	3.20	1.68	7.17	0.241	0.137	-0.247
ODP	kg CFC-11 eq	356E-9	900E-9	395E-9	1.65E-6	770E-9	114E-9	526E-9	60.6E-9	61.3E-9	-51.9E-9
Smog	kg O ₃ eq	0.290	0.734	0.364	1.39	0.658	0.111	0.274	0.020	0.029	-0.047
AP	kg SO ₂ eq	0.013	0.037	0.030	0.080	0.034	0.006	0.029	0.001	0.001	-0.002
EP	kg N eq	0.006	0.004	0.036	0.047	0.004	0.003	0.051	0.0002	0.0002	-0.0004
Carcinogenics	CTUh	77.3E-9	105E-9	471E-9	653E-9	91.0E-9	40.6E-9	246E-9	6.40E-9	5.34E-9	-12.6E-9
No Carcinogenics	CTUh	361E-9	701E-9	1.53E-6	2.59E-6	605E-9	257E-9	2.63E-6	57.8E-9	16.5E-9	-62.7E-9
RE	kg PM2.5 eq	0.354	0.004	0.030	0.388	0.003	0.001	0.006	0.0002	0.0002	-0.0002
Ecotoxicity	CTUe	14.9	24.2	50.1	89.2	21.0	9.39	136	1.86	0.806	-3.22
FFD	MJ surplus	3.25	8.04	8.63	19.9	6.88	1.13	3.16	0.542	0.571	-0.472

Acronyms
 GWP: Global Warming Potential, ODP: Ozone Layer Depletion, AP: Acidification Potential, EP: Eutrophication Potential, RE: Respiratory Effects,
 FFD: Fossil fuel Depletion.

Legend
 A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, A5: Installation, C1: De-Construction,
 C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

Environmental Impacts for 1 m² of Natural Stone (20 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B2	C2	C4	D
GWP	kg CO ₂ eq	3.20	7.42	11.9	22.5	6.37	1.68	7.17	0.479	0.274	-0.492
ODP	kg CFC-11 eq	552E-9	1.79E-6	674E-9	3.02E-6	2E-6	114E-9	526E-9	120.6E-9	122.1E-9	-103.2E-9
Smog	kg O ₃ eq	0.541	1.46	0.623	2.62	1.310	0.111	0.274	0.039	0.058	-0.093
AP	kg SO ₂ eq	0.023	0.073	0.054	0.150	0.068	0.006	0.029	0.002	0.002	-0.004
EP	kg N eq	0.011	0.009	0.070	0.089	0.007	0.003	0.051	0.0005	0.0005	-0.0009
Carcinogenics	CTUh	120E-9	209E-9	836E-9	1.16E-6	18E-9	4.06E-9	246E-9	12.73E-9	10.62E-9	-25.1E-9
No Carcinogenics	CTUh	513E-9	1.39E-6	2.75E-6	4.65E-6	1.20E-6	2.57E-9	2.63E-6	115E-9	32.9E-9	-125E-9
RE	kg PM2.5 eq	0.708	0.007	0.059	0.774	0.006	0.001	0.006	0.0003	0.0003	-0.0005
Ecotoxicity	CTUe	19.1	48.1	84.7	152	41.7	9.39	136	3.70	1.604	-6.41
FFD	MJ surplus	5.27	16.0	14.3	35.5	13.7	1.13	3.16	1.08	1.14	-0.939

Acronyms
 GWP: Global Warming Potential, ODP: Ozone Layer Depletion, AP: Acidification Potential, EP: Eutrophication Potential, RE: Respiratory Effects, FFD: Fossil fuel Depletion.

Legend
 A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

Environmental Impacts for 1 m² of Natural Stone (30 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B2	C2	C4	D
GWP	kg CO ₂ eq	4.47	11.1	17.2	32.7	9.51	18.1	7.17	0.715	0.410	-0.735
ODP	kg CFC-11 eq	748E-9	2.67E-6	950E-9	4.37E-6	2.29E-6	1.23E-6	526E-9	180E-9	183E-9	-154E-9
Smog	kg O ₃ eq	0.792	2.18	0.881	3.85	1.96	1.23	0.274	0.058	0.087	-0.139
AP	kg SO ₂ eq	0.033	0.110	0.078	0.220	0.101	0.091	0.029	0.003	0.004	-0.006
EP	kg N eq	0.015	0.013	0.103	0.131	0.011	0.098	0.051	0.0007	0.0007	-0.001
Carcinogenics	CTUh	16.2E-9	312E-9	1.20E-6	1.67E-6	270E-9	19.7E-6	246E-9	19.0E-9	15.9E-9	-37.4E-9
No Carcinogenics	CTUh	665E-9	2.08E-6	3.95E-6	6.70E-6	1.80E-6	20.7E-6	2.63E-6	172E-9	49.2E-9	-186E-9
RE	kg PM2.5 eq	1.06	0.011	0.087	1.16	0.009	0.047	0.006	0.0005	0.0005	-0.0007
Ecotoxicity	CTUe	23.2	71.8	119	214	62.2	1259	136	5.52	2.40	-9.56
FFD	MJ surplus	7.29	23.9	19.9	51.0	20.4	12.6	3.16	1.61	1.70	-1.40

Acronyms
 GWP: Global Warming Potential, ODP: Ozone Layer Depletion, AP: Acidification Potential, EP: Eutrophication Potential, RE: Respiratory Effects, FFD: Fossil fuel Depletion.

Legend
 A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

Environmental Impacts for 1 m² of Natural Stone (40 mm)

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B2	C2	C4	D
GWP	kg CO ₂ eq	5.74	14.8	22.6	43.1	12.7	18.1	7.17	0.956	0.546	-0.982
ODP	kg CFC-11 eq	944E-9	3.57E-6	1.23E-6	5.75E-6	3.06E-6	1.23E-6	5.26E-9	241E-9	243E-9	-206E-9
Smog	kg O ₃ eq	1.043	2.91	11.43	5.10	2.61	1.23	0.274	0.078	0.116	-0.185
AP	kg SO ₂ eq	0.042	0.147	0.103	0.292	0.136	0.091	0.029	0.004	0.005	-0.008
EP	kg N eq	0.020	0.017	0.137	0.173	0.015	0.098	0.051	0.0010	0.0010	-0.002
Carcinogenics	CTUh	205E-9	417E-9	1.57E-6	2.19E-6	361E-9	19.7E-6	246E-9	25.4E-9	21.2E-9	-50.0E-9
No Carcinogenics	CTUh	816E-9	2.78E-6	5.19E-6	8.78E-6	2.40E-6	20.7E-6	2.63E-6	229E-9	65.6E-9	-249E-9
RE	kg PM2.5 eq	1.41	0.014	0.117	1.55	0.013	0.047	0.006	0.0007	0.0006	-0.0009
Ecotoxicity	CTUe	27.3	95.9	154	277	83.2	1259	136	7.38	3.20	-12.8
FFD	MJ surplus	9.30	31.9	25.6	66.8	27.3	12.6	3.16	2.15	2.27	-1.87
Acronyms	GWP: Global Warming Potential. ODP: Ozone Layer Depletion. AP: Acidification Potential. EP: Eutrophication Potential. RE: Respiratory Effects. FFD: Fossil fuel Depletion.										

Legend	A1: Raw Material Supply. A2: Transport. A3: Manufacturing. A1-A3: Sum of A1, A2, and A3. A4: Transport to Site. A5: Installation. C1: De-Construction. C2: Waste Transport. C3: Waste Processing. C4: Disposal. D: Benefits and Loads Beyond the System Boundary.
Environmental Impacts for 1 m ² of Natural Stone (50 mm)	

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	B2	C2	C4	D
GWP	kg CO ₂ eq	7.01	18.5	27.9	53.5	15.9	18.1	7.17	1.19	0.682	-1.227
ODP	kg CFC-11 eq	1.14E-6	4.46E-6	1.51E-6	7.11E-6	3.82E-6	1.23E-6	5.26E-9	301E-9	304E-9	-257E-9
Smog	kg O ₃ eq	1.29	3.64	1.403	6.34	3.27	1.23	0.274	0.097	0.145	-0.231
AP	kg SO ₂ eq	0.052	0.183	0.127	0.362	0.169	0.091	0.029	0.004	0.006	-0.011
EP	kg N eq	0.024	0.021	0.170	0.216	0.019	0.098	0.051	0.0012	0.001	-0.002
Carcinogenics	CTUh	247E-9	521E-9	1.93E-6	2.70E-6	452E-9	19.7E-6	246E-9	31.7E-9	26.5E-9	-62.5E-9
No Carcinogenics	CTUh	968E-9	3.48E-6	6.40E-6	10.85E-6	3.00E-6	20.7E-6	2.63E-6	287E-9	81.9E-9	-311E-9
RE	kg PM2.5 eq	1.77	0.018	0.145	1.93	0.016	0.047	0.006	0.0008	0.001	-0.001
Ecotoxicity	CTUe	31.4	120	188	340	104	1259	136	9.22	4.00	-16.0
FFD	MJ surplus	11.3	39.9	31.3	82.5	34.1	12.6	3.16	2.69	2.83	-2.34
Acronyms	GWP: Global Warming Potential. ODP: Ozone Layer Depletion. AP: Acidification Potential. EP: Eutrophication Potential. RE: Respiratory Effects. FFD: Fossil fuel Depletion.										
Legend	A1: Raw Material Supply. A2: Transport. A3: Manufacturing. A1-A3: Sum of A1, A2, and A3. A4: Transport to Site. A5: Installation. C1: De-Construction. C2: Waste Transport. C3: Waste Processing. C4: Disposal. D: Benefits and Loads Beyond the System Boundary.										

References

- /GPI/ General Programme Instructions of the International EPD® System. Version 3.0.
- /EN ISO 9001/ Quality Management Systems - Requirements
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- /ISO 45001/ Occupational Health & Safety Management System - Requirements
- /ISO 14020:2000/ Environmental Labels and Declarations — General principles
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- /ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)
- /PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2019:14 Version 1.1 DATE 2019-12-20
- /The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com
- /Ecoinvent / Ecoinvent Centre, www.ecoinvent.org
- /SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com
- /TLCID/ Turkish Life Cycle Inventory Database, Turkish Center for Sustainable Production Research and Design (SURATAM), www.suratam.org

Contact Information

Programme

EPD registered through fully aligned regional programme:
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